

Lead Samples

Report Filters

Submission Year is 2015 and Quarter is 4 and PWS ID is IL1055030 and PWS Name is IL AMERICAN-PONTIAC and Contaminant Code is PB90 and LCR Sample Start Date <= 09/30/2015 and LCR Sample End Date >= 10/01/1992

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1 - 11 of 11

EPA Region	PWS ID	PWS Name	Primacy Agency Code	Contaminant Name	Sample Measure (mg/L)	Sampling Start Date
05	IL1055030	IL AMERICAN-PONTIAC	LEAD SUMMARY	.004	10/01/1992	03/31/1993 ^
05	IL1055030	IL AMERICAN-PONTIAC	LEAD SUMMARY	.006	01/01/1993	12/31/1993
05	IL1055030	IL AMERICAN-PONTIAC	LEAD SUMMARY	.007	01/01/1994	12/31/1994
05	IL1055030	IL AMERICAN-PONTIAC	LEAD SUMMARY	.008	01/01/1996	12/31/1998
05	IL1055030	IL AMERICAN-PONTIAC	LEAD SUMMARY	.004	01/01/1999	12/31/2001 v

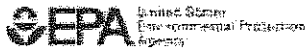
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05	IL1055030	IL AMERICAN- PONTIAC	IL	LEAD SUMMARY	.005	01/01/2008	12/31/2010
05	IL1055030	IL AMERICAN- PONTIAC	IL	LEAD SUMMARY	.003	01/01/2009	12/31/2011
05	IL1055030	IL AMERICAN- PONTIAC	IL	LEAD SUMMARY	.003	01/01/2011	12/31/2013
05	IL1055030	IL AMERICAN- PONTIAC	IL	LEAD SUMMARY	.004	01/01/2002	12/31/2004

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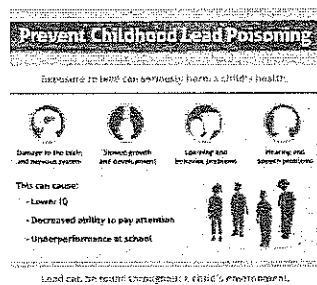
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5	IL1055030	IL AMERICAN-PONTIAC	IL	LEAD SUMMARY	0.004	10/1/1992	3/31/1993	A	CWS	11864	SW	N		4460
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5	IL1055030	IL AMERICAN-PONTIAC	IL	LEAD SUMMARY	0.007	1/1/1994	12/31/1994	A	CWS	11864	SW	N		4460
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5	IL1055030	IL AMERICAN-PONTIAC	IL	LEAD SUMMARY	0.004	1/1/1999	12/31/2001	A	CWS	11864	SW	N		4460
5	IL1055030	IL AMERICAN-PONTIAC	IL	LEAD SUMMARY	0.004	1/1/2002	12/31/2004	A	CWS	11864	SW	N		4460
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5	IL1055030	IL AMERICAN-PONTIAC	IL	LEAD SUMMARY	0.003	1/1/2011	12/31/2013	A	CWS	11864	SW	N		4460
5	IL1055030	IL AMERICAN-PONTIAC	IL	LEAD SUMMARY	0.003	1/1/2012	12/31/2014	A	CWS	11864	SW	N		4460



Lead

Learn about Lead

General Lead Information



Read more about lead in this CDC informational graphic

- What is lead?
- Where is lead found?
- What are the health effects of lead?
- Who is at risk?
- Lead exposure data
- Lower your chances of exposure to lead

What is Lead?

Lead is a naturally occurring element found in small amounts in the earth's crust. While it has some beneficial uses, it can be toxic to humans and animals causing of health effects.

Where is Lead Found?

Lead can be found in all parts of our environment – the air, the soil, the water, and even inside our homes. Much of our exposure comes from human activities including the use of fossil fuels including past use of leaded gasoline, some types of industrial facilities, and past use of lead-based paint in homes. Lead and lead compounds have been used in a wide variety of products found in and around our homes, including paint, ceramics, pipes and plumbing materials, solders, gasoline, batteries, ammunition, and cosmetics.

Lead may enter the environment from these past and current uses. Lead can also be emitted into the environment from industrial sources and contaminated sites, such as former lead smelters. While natural levels of lead in soil range between 50 and 400 parts per million, mining, smelting, and refining activities have resulted in substantial increases in lead levels in the environment, especially near mining and smelting sites.

When lead is released to the air from industrial sources or vehicles, it may travel long distances before settling to the ground, where it usually sticks to soil particles. Lead may move from soil into ground water depending on the type of lead compound and the characteristics of the soil.

Federal and state regulatory standards have helped to reduce the amount of lead in air, drinking water, soil, consumer products, food, and occupational settings.

Learn more about sources of lead exposure:

- At home
 - At schools and childcare facilities
 - In products
 - In drinking water
 - In outdoor air
 - In soil
 - In dust
-

Who is at Risk?

Children

Lead is particularly dangerous to children because their growing bodies absorb more lead than adults do and their brains and nervous systems are more sensitive to the damaging effects of lead. Babies and young children can also be more highly exposed to lead because they often put their hands and other objects that can have lead from dust or soil on them into their mouths. Children may also be exposed to lead by eating and drinking food or water containing lead or from dishes or glasses that contain lead, inhaling lead dust from lead-based paint or lead-contaminated soil or from playing with toys with lead paint.

Adults, Including Pregnant Women

Adults may be exposed to lead by eating and drinking food or water containing lead or from dishes or glasses that contain lead. They may also breathe lead dust by spending time in areas where lead-based paint is deteriorating, and during renovation or repair work that disturbs painted surfaces in older homes and buildings. Working in a job or engaging in hobbies where lead is used, such as making stained glass, can increase exposure as can certain folk remedies containing lead. A pregnant woman's exposure to lead from these sources is of particular concern because it can result in exposure to her developing baby.

Lead Exposure Data

The U.S. Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics monitors blood lead levels in the United States. Get information on the number of children with elevated blood lead levels, and number and percentage of children tested for lead in your area.

According to CDC (PDF) (2 pp, 291 K, About PDF)

- The most important step parents, doctors, and others can take is to **prevent lead exposure before it occurs**.
- Until recently, children were identified as having a blood lead level of concern if the test result is 10 or more micrograms per deciliter of lead in blood. Experts now use a new level based on the U.S. population of children ages 1-5 years who are in the top 2.5% of children when tested for lead in their blood (when compared to children who are exposed to more lead than most children). Currently that is 5 micrograms per deciliter of lead in blood. The new, lower value means that more children likely will be identified as having lead exposure allowing parents, doctors, public health officials, and communities to take action earlier to reduce the child's future exposure to lead.

EPA uses the CDC data to show trends on blood lead levels in children in *America's Children and the Environment*.

What are the Health Effects of Lead?

Lead can affect almost every organ and system in your body. Children six years old and younger are most susceptible to the effects of lead.

Children

Even low levels of lead in the blood of children can result in:

- Behavior and learning problems
- Lower IQ and Hyperactivity
- Slowed growth
- Hearing Problems
- Anemia

In rare cases, ingestion of lead can cause seizures, coma and even death.

Pregnant Women

Lead can accumulate in our bodies over time, where it is stored in bones along with calcium. During pregnancy, lead is released from bones as maternal calcium and is used to help form the bones of the fetus. This is particularly true if a woman does not have enough dietary calcium. Lead can also cross the placental barrier exposing the fetus the lead. This can result in serious effects to the mother and her developing fetus, including:

- Reduced growth of the fetus
- Premature birth

Find out more about lead's effects on pregnancy:

- March of Dimes Healthy Pregnancy [Exit](#)
- Effects of Workplace Hazards on Female Reproductive Health, National Institute for Occupational Safety and Health

Lead can also be transmitted through breast milk. Read more on lead exposure in pregnancy and lactating women (PDF) (302 pp, 4.2 MB, About PDF).

Other Adults

Lead is also harmful to other adults. Adults exposed to lead can suffer from:

- Cardiovascular effects, increased blood pressure and incidence of hypertension
- Decreased kidney function
- Reproductive problems (in both men and women)

Read more on the health effects of lead

- EPA's Integrated Science Assessment for Lead
 - Agency for Toxic Substances and Disease Registry (ATSDR).
-

Lower Your Chances of Exposure to Lead

Simple steps like keeping your home clean and well-maintained will go a long way in preventing lead exposure. You can lower the chances of exposure to lead in your home, both now and in the future, by taking these steps:

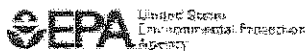
- Inspect and maintain all painted surfaces to prevent paint deterioration
- Address water damage quickly and completely
- Keep your home clean and dust-free
- Clean around painted areas where friction can generate dust, such as doors, windows, and drawers. Wipe these areas with a wet sponge or rag to remove paint chips or dust
- Use only cold water to prepare food and drinks
- Flush water outlets used for drinking or food preparation
- Clean debris out of outlet screens or faucet aerators on a regular basis
- Wash children's hands, bottles, pacifiers and toys often
- Teach children to wipe and remove their shoes and wash hands after playing outdoors
- Ensure that your family members eat well-balanced meals. Children with healthy diets absorb less lead. See [Lead and a Healthy Diet, What You Can Do to Protect Your Child \(PDF\)](#)
- If you are having home renovation, repairs, or painting done, make sure your contractor is Lead-Safe Certified, and make sure they follow lead safe work practices (PDF)

Determine if your family is at risk for lead poisoning with the [Lead Poisoning Home Checklist \(PDF\)](#).

What do I do if I think my child or I have been exposed to lead?

Talk to your pediatrician, general physician, or local health agency about what you can do. Your doctor can do a simple blood test to check you or your child for lead exposure. You may also want to test your home for sources of lead.

Last updated on October 15, 2015



Basic Information about Lead in Drinking Water

Have a question that's not answered on this page? Contact the Safe Drinking Water Hotline.

EPA and the Centers for Disease Control and Prevention (CDC) agree that there is no known safe level of lead in a child's blood. Lead is harmful to health, especially for children. On this page, you can find:

General Information about Lead in Drinking Water

- How lead gets into drinking water
- Health effects of being exposed to lead in drinking water
- Can I shower in lead-contaminated water?

Related Information from Other Federal Government Agencies

Centers for Disease Control and Prevention (CDC):

- About Lead in Drinking Water
- Prevention Tips for Lead in Water
- CDC main page on lead

Agency for Toxic Substances & Disease Registry (ATSDR):

- Public Health Statement for Lead
- ToxFAQs for Lead
- ATSDR main page on lead

What You Can Do

Learn how you can...

- Find out if lead is in your drinking water
- Take measures to reduce lead in drinking water at home
- Get your child tested to determine lead levels in his or her blood
- Find out if lead in drinking water is an issue in your child's school or child care facility

Drinking Water Requirements for Lead

- EPA's drinking water regulations for lead
 - How EPA requires states and public water systems to protect drinking water
-

General Information about Lead in Drinking Water

How Lead Gets into Drinking Water

Lead can enter drinking water when service pipes that contain lead corrode, especially where the water has high acidity or low mineral content that corrodes pipes and fixtures. The most common problem is with brass or chrome-plated brass faucets and fixtures with lead solder, from which significant amounts of lead can enter into the water, especially hot water.

Homes built before 1986 are more likely to have lead pipes, fixtures and solder. The Safe Drinking Water Act (SDWA) has reduced the maximum allowable lead content -- that is, content that is considered "lead-free" -- to be a weighted average of 0.25 percent calculated across the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures and 0.2 percent for solder and flux.

- Learn more about the maximum allowable content of lead in pipes, solder, fittings and fixtures
- Learn more about EPA's regulations to prevent lead in drinking water
- Learn how to identify lead-free certification marks on drinking water system and plumbing products (PDF)

Corrosion is a dissolving or wearing away of metal caused by a chemical reaction between water and your plumbing. A number of factors are involved in the extent to which lead enters the water, including:

- the chemistry of the water (acidity and alkalinity) and the types and amounts of minerals in the water,
- the amount of lead it comes into contact with,
- the temperature of the water,
- the amount of wear in the pipes,
- how long the water stays in pipes, and
- the presence of protective scales or coatings inside the plumbing materials.

To address corrosion of lead and copper into drinking water, EPA issued the Lead and Copper Rule (LCR) under the authority of the SDWA. One requirement of the LCR is corrosion control treatment to prevent lead and copper from contaminating drinking water. Corrosion control treatment means utilities must make drinking water less corrosive to the materials it comes into contact with on its way to consumers' taps. Learn more about EPA's regulations to prevent lead in drinking water.

*Health Effects of Exposures to Lead in Drinking Water

*The health effects information on this page is not intended to catalog all possible health effects for lead. Rather, it is intended to let you know about the most significant and probable health effects associated with lead in drinking water.

Is there a safe level of lead in drinking water?

The Safe Drinking Water Act requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks, are called maximum contaminant level goals (MCLGs). EPA has set the maximum contaminant level goal for lead in drinking water at zero because lead is a toxic metal that can be harmful to human health even at low exposure levels. Lead is persistent, and it can bioaccumulate in the body over time.

Young children, infants, and fetuses are particularly vulnerable to lead because the physical and behavioral effects of lead occur at lower exposure levels in children than in adults. A dose of lead that would have little effect on an adult can have a significant effect on a child. In children, low levels of exposure have been linked to damage to the central and peripheral nervous system, learning disabilities, shorter stature, impaired hearing, and impaired formation and function of blood cells.

The Centers for Disease Control and Prevention (CDC) recommends that public health actions be initiated when the level of lead in a child's blood is 5 micrograms per deciliter ($\mu\text{g/dL}$) or more.

It is important to recognize all the ways a child can be exposed to lead. Children are exposed to lead in paint, dust, soil, air, and food, as well as drinking water. If the level of lead in a child's blood is at or above the CDC action level of 5 micrograms per deciliter, it may be due to lead exposures from a combination of sources. EPA estimates that drinking water can make up 20 percent or more of a person's total exposure to lead. Infants who consume mostly mixed formula can receive 40 percent to 60 percent of their exposure to lead from drinking water.

Children

Even low levels of lead in the blood of children can result in:

- Behavior and learning problems
- Lower IQ and hyperactivity
- Slowed growth
- Hearing problems
- Anemia

In rare cases, ingestion of lead can cause seizures, coma and even death.

Pregnant Women

Lead can accumulate in our bodies over time, where it is stored in bones along with calcium. During pregnancy, lead is released from bones as maternal calcium and is used to help form the bones of the fetus. This is particularly true if a woman does not have enough dietary calcium. Lead can also cross the placental barrier exposing the fetus to lead. This can result in serious effects to the mother and her developing fetus, including:

- Reduced growth of the fetus
- Premature birth

Find out more about lead's effects on pregnancy:

- Lead and Your Baby (March of Dimes) [Link](#)
- Effects of Workplace Hazards on Female Reproductive Health (National Institute for Occupational Safety and Health)

Lead can also be transmitted through breast milk. Read more on lead exposure in pregnancy and lactating women (PDF) (302 pp, 4.3 MB, About PDF) .

Adults

Lead is also harmful to adults. Adults exposed to lead can suffer from:

- Cardiovascular effects, increased blood pressure and incidence of hypertension
- Decreased kidney function
- Reproductive problems (in both men and women)

Related Information

- Learn more about lead and its health effects

Can I shower in lead-contaminated water?

Yes. Bathing and showering should be safe for you and your children, even if the water contains lead over EPA's action level. Human skin does not absorb lead in water.

This information applies to most situations and to a large majority of the population, but individual circumstances may vary. Some situations, such as cases involving highly corrosive water, may require additional recommendations or more stringent actions. Your local water authority is always your first source for testing and identifying lead contamination in your tap water. Many public water authorities have websites that include data on drinking water quality, including results of lead testing. Links to such data can be found on the EPA Consumer Confidence Report website.

For more information, see CDC's "Sources of Lead: Water" Web page.

What You Can Do

Find Out if Lead is in Your Drinking Water

First, learn more about the water coming into your home

EPA requires all community water systems to prepare and deliver an annual water quality report called a *Consumer Confidence Report (CCR)* for their customers by July 1 of each year. Contact your water utility if you'd like to receive a copy of their latest report. If your water comes from a

household well or other private water supply, check with your health department, or with any nearby water utilities that use ground water, for information on contaminants of concern in your area.

- Find your local Consumer Confidence Report
- Information about CCRs for consumers
- EPA's CCR home page
- Learn more about protecting water quality from private drinking water wells
- Printable color fact sheet: Is There Lead in My Drinking Water?

EPA's **Public Notification Rule** requires public water systems to alert you if there is a problem with your drinking water.

- Learn more about the Public Notification Rule

Second, you can have your water tested for lead

Homes may have internal plumbing materials containing lead. Since you cannot see, taste, or smell lead dissolved in water, testing is the only sure way of telling whether there are harmful quantities of lead in your drinking water. A list of certified laboratories are available from your state or local drinking water authority. Testing costs between \$20 and \$100. Contact your water supplier as they may have useful information, including whether the service connector used in your home or area is made of lead.

You can learn on our Protect Your Family from Exposures to Lead web page:

- when you may want to test your drinking water; and
- what to do if your home tests positive for lead.

You can also view and print a fact sheet on testing your home's drinking water.

Take Measures to Reduce Lead in Drinking Water at Home

Flush your pipes before drinking: The more time water has been sitting in your home's pipes, the more lead it may contain. Anytime the water in a particular faucet has not been used for six hours or longer, "flush" your cold-water pipes by running the water until it becomes as cold as it will get. This could take as little as five to thirty seconds if there has been recent heavy water use such as showering or toilet flushing. Otherwise, it could take two minutes or longer. Your water utility will inform you if longer flushing times are needed to respond to local conditions.

Only use cold water for eating and drinking: Use only water from the cold-water tap for drinking, cooking, and especially for making baby formula. Hot water is likely to contain higher levels of lead. Run cold water until it becomes as cold as it can get.

Note that boiling water will NOT get rid of lead contamination.

Use water filters or treatment devices:

Many water filters and water treatment devices are certified by independent organizations for effective lead reduction. Devices that are not designed to remove lead will not work. Verify the claims of manufacturers by checking with independent certifying organizations that provide lists of treatment devices they have certified:

- NSF International [Exit](#)
- Water Quality Association [Exit](#)

Underwriters Laboratories also provides drinking water product certification services for drinking water products and chemicals. [Exit](#)

Related Information:

- Fact sheet: Actions You Can Take to Reduce Lead in Drinking Water
- How to make your home lead-safe
- What you can do to protect your drinking water
- Fact sheet: How to Identify Lead-Free Certification Marks for Drinking Water System & Plumbing Products (PDF)

Get Your Child Tested to Determine Lead Levels in His or Her Blood

A family doctor or pediatrician can perform a blood test for lead and provide information about the health effects of lead. State, city or county departments of health can also provide information about how you can have your child's blood tested for lead. The Centers for Disease Control and Prevention recommends that public health actions be initiated when the level of lead in a child's blood is 5 micrograms per deciliter (µg/dL) or more.

Find Out if Lead in Drinking Water is an Issue in Your Child's School or Child Care Facility

Children spend a significant part of their days at school or in a child care facility. The faucets that provide water used for consumption, including drinking, cooking lunch, and preparing juice and infant formula, should be tested.

- Protect your children from lead where they learn and play: learn how to test your child, and how to check the condition of schools and child care facilities
- How schools and child care centers can test for lead in drinking water
- EPA main page on drinking water at schools and child care facilities

Drinking Water Requirements for Lead

EPA's Drinking Water Regulations for Lead

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health

risks are called maximum contaminant level goals (MCLGs). The MCLG for lead is zero. EPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

For most contaminants, EPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCLG. MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, EPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant.

The treatment technique regulation for lead (referred to as the *Lead and Copper Rule*) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10 percent of tap water samples exceed the lead action level of 15 parts per billion, then water systems are required to take additional actions including:

- Taking further steps optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control) .
- Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.
- Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

EPA issued the Lead and Copper Rule in 1991 and revised the regulation in 2000 and 2007. States may set more stringent drinking water regulations than EPA.

In addition:

- EPA requires all community water systems to prepare and deliver an annual water quality report called a *Consumer Confidence Report (CCR)* for their customers.
 - Find your local Consumer Confidence Report
 - Information about CCRs for consumers
 - EPA's CCR home page
- EPA's *Public Notification Rule* requires public water systems to alert you if there is a problem with your drinking water.
 - Learn more about the Public Notification Rule.
- In 2011, changes to the Safe Drinking Water Act reduced the maximum allowable lead content -- that is, content that is considered "lead-free" -- to be a weighted average of 0.25 percent calculated across the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixture and 0.2 percent for solder and flux. Learn more about the maximum allowable content of lead in pipes, solder, fittings and fixtures.

How EPA Requires States and Public Water Systems to Protect Drinking Water

The Safe Drinking Water Act (SDWA) requires EPA to establish and enforce standards that public drinking water systems must follow. EPA delegates primary enforcement responsibility (also called *primacy*) for public water systems to states and tribes if they meet certain requirements.

Learn more about:

- The SDWA and SDWA standards
- How EPA regulates drinking water contaminants
- Primacy enforcement responsibility for public water systems

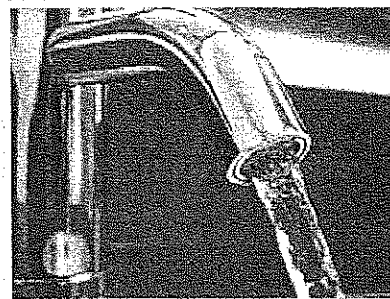
Last updated on March 17, 2016



Centers for Disease
Control and Prevention
CDC 24/7: Saving Lives. Protecting People™

About Lead in Drinking Water

For more than 20 years, CDC has championed children's health by working together with other federal agencies and through effective programs and policies to prevent childhood lead poisoning. Exposure to lead can cause behavior problems and learning disabilities in young children and can also affect the health of adults. Lead can be found in many sources. Lead-based paint and the dust produced as it deteriorates, found mostly in older homes built before 1978, are major contributors of lead exposure in U.S. children. Lead can also be found in some water pipes inside the home or pipes that connect homes to the main water supply pipe. Lead found in tap water usually comes from the decay of old lead-based pipes, fixtures or from leaded solder that connects drinking water pipes.



Most of CDC's work related to lead in water has occurred in the District of Columbia (DC), where approximately 23,000 homes have lead-based water service pipes. As part of its lead-in-water testing program, DC Water and Sewer Authority (WASA) expanded testing to include homes with lead service pipes extending from the water main to the house. By late January 2004, results of the expanded water testing indicated that most of the homes tested had water lead levels that were above the U.S. Environmental Protection Agency's (EPA) action level of 15 parts per billion (ppb). The action level indicates that utilities must take certain steps to correct the problem and notify citizens of the situation. On February 16, DC Department of Health (DCDOH) requested CDC's help in reviewing health effects of elevated lead levels in residential tap water.

An analysis of available blood lead surveillance data was published in an April 2004 edition of Morbidity Mortality Weekly Review (MMWR). CDC reported that the percentage of test results $>10 \mu\text{g/dL}$, CDC's blood lead level of concern, as well as the percentage of test results $>5 \mu\text{g/dL}$ were higher at addresses with lead service pipes than at addresses without lead service pipes.

However, a large number of test results from blood samples collected from DC-area children in 2003 were unavailable and not included in the analysis published in the 2004 MMWR. In 2009, CDC acquired all known 2003 test results and completed a reanalysis of blood lead levels that involved over 23,000 blood lead tests to determine if the addition of the missing test results changed the previously reported results. This included 9,765 tests that were used in the original analysis, and

1,753 tests reported in surveillance data after the MMWR was published. An additional 12,168 tests that had not been included in the surveillance files were also part of the reanalysis. The addition of the missing test data led to an overall decrease in the percent of children with elevated blood lead levels $\geq 5 \mu\text{g/dL}$ and $\geq 10 \mu\text{g/dL}$ in 2003, regardless of the type of service line supplying water to the home. These results support CDC's original conclusions that the percentage of test results $>10 \mu\text{g/dL}$, as well as the percentage of test results $>5 \mu\text{g/dL}$ were higher at addresses with lead service pipes than at addresses without lead service pipes. CDC reiterates a key message from the 2004 MMWR: *No safe blood level has been identified and all sources of lead exposure for children should be controlled or eliminated. Lead concentrations in drinking water should be below the U. S. Environmental Protection Agency's action level of 15 parts per billion.*

Resources

Information for Washington, D.C. Residents

- DC Water and Sewer Authority (<http://www.dcwasa.com/lead>)

Prevention Tips

- Water FAQ

Correspondence

- Washington, D.C. Blood Lead Level Tests, 05/20/2010
- Lead-based Water Lines, 01/12/2010

Research/Data

- NEW! Lead in Drinking Water and Human Blood Lead Levels in the United States, *MMWR*, August 10, 2012
- Association between children's blood lead levels, lead service lines, and water disinfection, Washington, DC, 1998-2006
(<http://www.sciencedirect.com/science/article/pii/S001393511000160X>)
- Notice to Readers: Limitations Inherent to a Cross-Sectional Assessment of Blood Lead Levels Among Persons Living in Homes with High Levels of Lead in Drinking Water Reported in *MMWR Weekly*, June 25, 2010/ 50 (24); 751
- Notice to Readers: Examining the Effect of Previously Missing Blood Lead Surveillance Data on Results Reported in *MMWR Weekly*, May 21, 2010 / 59(19);592
- Examining the Effect of Previously Missing Blood Lead Level (BPb) Surveillance Data on Results Reported in the *MMWR* (April, 2, 2004/53(12):268-270)
- Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water – District of Columbia, Stokes L, Onwuche NC, Thomas P, et al., 2004; *MMWR Weekly*, April 2, 2004, 53 (12); 268-270

Page last reviewed: May 20, 2010

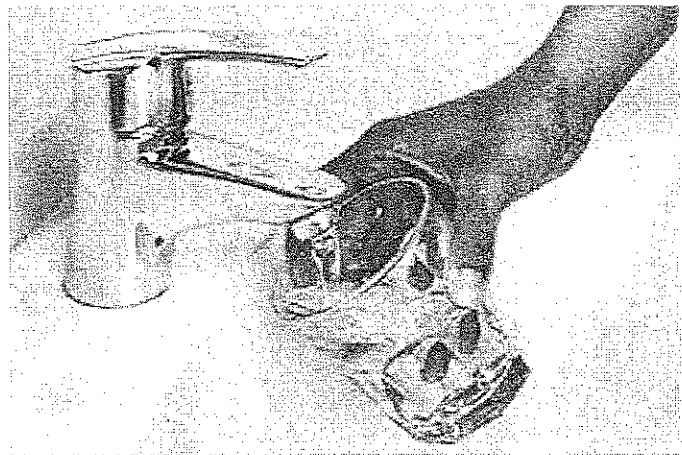
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Content source: National Center for Environmental Health (/nceh), Division of Emergency and Environmental Health Services (/nceh/eehs/default.htm)



Water

For information about lead in water in Flint, MI, please visit



<http://www.phe.gov/emergency/events/Flint/Pages/water.aspx>
(<http://www.phe.gov/emergency/events/Flint/Pages/water.aspx>)

How does lead get into my tap water?

Measures taken during the last two decades have greatly reduced exposures to lead in tap water. These measures include actions taken under the requirements of the 1986 and 1996 amendments to the Safe Drinking Water Act (<http://www.epa.gov/sdwa> (<http://www.epa.gov/sdwa>)) and the U.S. Environmental Protection Agency's (EPA's) Lead and Copper Rule (<http://www.epa.gov/dwreginfo/lead-and-copper-rule> (<http://www.epa.gov/dwreginfo/lead-and-copper-rule>)).

Even so, lead still can be found in some metal water taps, interior water pipes, or pipes connecting a house to the main water pipe in the street. Lead found in tap water usually comes from the corrosion of older fixtures or from the solder that connects pipes. When water sits in leaded pipes for several hours, lead can leach into the water supply.

How do I know if my tap water is contaminated with lead?

The only way to know whether your tap water contains lead is to have it tested. You cannot see, taste, or smell lead in drinking water. Therefore, you must ask your water provider whether your water has lead in it. For homes served by public water systems, data on lead in tap water may be available on the Internet from your local water authority. If your water provider does not post this information, you should call and find out.

Does a high lead level in my tap water cause health effects?

High levels of lead in tap water can cause health effects if the lead in the water enters the bloodstream and causes an elevated blood lead level.

Most studies show that exposure to lead-contaminated water alone would not be likely to elevate blood lead levels in most adults, even exposure to water with a lead content close to the EPA action level for lead of 15 parts per billion (ppb). Risk will vary, however, depending on the individual, the circumstances, and the amount of water consumed. For example, infants who drink formula prepared with lead-contaminated water may be at a higher risk because of the large volume of water they consume relative to their body size.

What can I do to reduce or eliminate lead in my tap water?

If your tap water contains lead at levels exceeding EPA's action level of 15 ppb, you should take action to minimize your exposure to the lead in the water.

You should begin by asking your water authority these questions:

1. Does my water have lead in it above EPA's action level of 15 parts per billion (ppb)?

If the answer is no, no action is needed.

If the answer is yes, also ask the next question:

2. Does the service pipe at the street (header pipe) have lead in it?

This information is very important. It determines which of the next two actions (A or B) you should follow to protect your household's health.

A) If the pipe in the street (header pipe) DOES NOT have lead, the lead in your tap water may be coming from fixtures, pipes, or elsewhere inside your home.

Until you eliminate the source, you should take the following steps any time you wish to use tap water for drinking or cooking, especially when the water has been off and sitting in the pipes for more than 6 hours:

a. Before using any tap water for drinking or cooking, flush your water system by running the kitchen tap (or any other tap you take drinking or cooking water from) on **COLD** for 1-2 minutes;

b. Then, fill a clean container(s) with water from this tap. This water will be suitable for drinking, cooking, preparation of baby formula, or other consumption. To conserve water, collect multiple containers of water at once (after you have fully flushed the water from the tap as described).

B) If the pipe at the street (header pipe) DOES contain lead, lead in the tap water may be coming from that pipe or connected pipes (it may also be coming from sources inside your home).

Until the lead source is eliminated, you should take the following steps any time you wish to use tap water for drinking or cooking, especially when the water has been off and sitting in the pipes for more than 6 hours. Please note that **additional flushing is necessary**:

- a. Before using any tap water for drinking or cooking, run high-volume taps (such as your shower) on COLD for 5 minutes or more;
- b. Then, run the kitchen tap on COLD for 1–2 additional minutes;
- c. Fill a clean container(s) with water from this tap. This water will be suitable for drinking, cooking, preparation of baby formula, or other consumption. To conserve water, collect multiple containers of water at once (after you have fully flushed the water from the tap as described).

3. In all situations, drink or cook only with water that comes out of the tap cold. Water that comes out of the tap warm or hot can contain much higher levels of lead. Boiling this water will NOT reduce the amount of lead in your water.

4. You can also reduce or eliminate your exposure to lead in drinking water by consuming only bottled water or water from a filtration system that has been certified by an independent testing organization to reduce or eliminate lead. See [resources](#) below.

5. Children and pregnant women are especially vulnerable to the effects of lead exposure.

Therefore, for homes with children or pregnant women and with water lead levels exceeding EPA's action level of 15 ppb, CDC recommends using bottled water or water from a filtration system that has been certified by an independent testing organization to reduce or eliminate lead for cooking, drinking, and baby formula preparation. Because most bottled water does not contain fluoride, a fluoride supplement may be necessary.

Also, some bottled waters have not been tested and may not be appropriate for consumption. Contact independent testing organizations that certify bottled water. See [resources](#) below.

6. Make sure that repairs to copper pipes do not use lead solder.

Advice for lead safe water practices after plumbing work in housing with lead water lines or lead solder.

These practices include

1. Testing water after plumbing work in older housing. Please contact your [state lead program](#) for information about water testing in your area.
2. Inspecting the aerator on the end of the faucet and removing any debris such as metal particles.
3. Flushing water lines before using the water for drinking or cooking.

If you own your home, you may also consider full replacement of lead water lines by removing the private lines running from the water meter into your home. This precaution has not been adequately studied, however, because the data available to CDC included too few homes having had full replacement of lead water lines. Contact your water authority for information about replacing water service lines.

If my water has high lead levels, is it safe to take a bath or shower?

Yes. Bathing and showering should be safe for you and your children, even if the water contains lead over EPA's action level. Human skin does not absorb lead in water.

This information applies to most situations and to a large majority of the population, but individual circumstances may vary. Some situations, such as cases involving highly corrosive water, may require additional recommendations or more stringent actions. Your local water authority is always your first source for testing and identifying lead contamination in your tap water. Many public water authorities have websites that include data on drinking water quality, including results of lead testing. Links to such data can be found on the EPA website: <http://www.epa.gov/ccr> (<http://www.epa.gov/ccr>).

Resources

Please visit the following sites for more information:

General:

Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water---District of Columbia, 2004 (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5312a6.htm>). *MMWR*. April 2, 2004; 53 (12):268-270.

Addendum: After release of the *MMWR* article titled "Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water -- District of Columbia, 2004," some reports have suggested erroneously that CDC determined that lead in residential tap water at concentrations as high as 300 parts per billion is 'safe.' CDC reiterates the key message from the 2004 article: because no safe blood level has been identified for young children, all sources of lead exposure for children should be controlled or eliminated. Lead concentrations in drinking water should be below the EPA action level of 15 parts per billion.

EPA - Drinking Water Requirements for States and Public Water Systems

(<http://www.epa.gov/dwreginfo>) and information on chemical and microbial contaminants. Safe Drinking Water Hotline: 1-800-426-4791.

Water Fluoridation: CDC - Community Water Fluoridation (<http://www.cdc.gov/fluoridation/>) fact sheets, frequently asked questions, and publications.

Bottled Water and Water Filters:

- NSF International (<http://www.nsf.org/>), a nonprofit organization that certifies bottled water (<http://info.nsf.org/certified/bwpi/>) and water filters (<http://info.nsf.org/Certified/DWTU/>).
Consumer Affairs Office toll-free hotline: 1-800-673-8010.
- International Bottled Water Association (<http://www.bottledwater.org/>), the trade association that represents the bottled water industry. Information Hotline: 1-800-WATER-11.

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Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People.™

Public Health Statement for Lead

(*Plomo*)

August 2007

CAS# 7439-92-1

[PDF Version, 83 KB](#)

This Public Health Statement is the summary chapter from the Toxicological Profile for Lead. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQ™, is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-800-232-4636.

This public health statement tells you about lead and the effects of exposure to it

The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. Lead has been found in at least 1,272 of the 1,684 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the possibility exists that the number of sites at which lead is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to this substance may harm you.

When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact.

If you are exposed to lead, many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

*CDC has updated its recommendations on children's blood lead levels. Experts now use an upper reference level value of 97.5% of the population distribution for children's blood lead. In 2012-2015 that value is 5 micrograms per deciliter (µg/dL) to identify children with blood lead levels that are much higher than most children's levels. The information on this page refers to CDC's previous "blood lead level of concern" of 10 µg/dL. This information will be updated in future ToxProfile and ToxFAQ editions. To learn more about CDC's updated recommendations on children's blood lead levels, please visit:

http://www.cdc.gov/nceh/lead/ACCLPP/blood_lead_levels.htm.

1.1 What is lead?

Lead is a heavy, low melting, bluish-gray metal that occurs naturally in the Earth's crust. However, it is rarely found naturally as a metal. It is usually found combined with two or more other elements to form lead compounds.

Metallic lead is resistant to corrosion (i.e., not easily attacked by air or water). When exposed to air or water, thin films of lead compounds are formed that protect the metal from further attack. Lead is easily molded and shaped. Lead can be combined with other metals to form alloys. Lead and lead alloys are commonly found in pipes, storage batteries, weights, shot and ammunition, cable covers, and sheets used to shield us from radiation. The largest use for lead is in storage batteries in cars and other vehicles.

Lead compounds are used as a pigment in paints, dyes, and ceramic glazes and in caulk. The amount of lead used in these products has been reduced in recent years to minimize lead's harmful effect on people and animals. Tetraethyl lead and tetramethyl lead were once used in the United States as gasoline additives to increase octane rating. However, their use was phased out in the United States in the 1980s, and lead was banned for use in gasoline for motor vehicles beginning January 1, 1996. Tetraethyl lead may still be used in gasoline for off-road vehicles and airplanes. It is also still used in a number of developing countries. Lead used in ammunition, which is the largest non-battery end-use, has remained fairly constant in recent years. However, even the use of lead in bullets and shot as well as in fishing sinkers is being reduced because of its harm to the environment.

Most lead used by industry comes from mined ores ("primary") or from recycled scrap metal or batteries ("secondary"). Lead is mined in the United States, primarily in Alaska and Missouri. However, most lead today is "secondary" lead obtained from lead-acid batteries. It is reported that 97% of these batteries are recycled.

1.2 What happens to lead when it enters the environment?

Lead occurs naturally in the environment. However, most of the high levels found throughout the environment come from human activities. Environmental levels of lead have increased more than 1,000-fold over the past three centuries as a result of human activity. The greatest increase occurred between the years 1950 and 2000, and reflected increasing worldwide use of leaded gasoline. Lead can enter the environment through releases from mining lead and other metals, and from factories that make or use lead, lead alloys, or lead compounds. Lead is released into the air during burning coal, oil, or waste. Before the use of leaded gasoline was banned, most of the lead released into the U.S. environment came from vehicle exhaust. In 1979, cars released 94.6 million kilograms (208.1 million pounds) of lead into the air in the United States. In 1989, when the use of lead was limited but not banned, cars released only 2.2 million kg (4.8 million pounds) to the air. Since EPA banned the use of leaded gasoline for highway transportation in 1996, the amount of lead released into the air has decreased further. Before the 1950s, lead was used in pesticides applied to fruit orchards. Once lead gets into the atmosphere, it may travel long distances if the lead particles are very small. Lead is removed from the air by rain and by particles falling to land or into surface water.

Sources of lead in dust and soil include lead that falls to the ground from the air, and weathering and chipping of lead-based paint from buildings, bridges, and other structures. Landfills may contain waste from lead ore mining, ammunition manufacturing, or other

industrial activities such as battery production. Disposal of lead-containing products contribute to lead in municipal landfills. Past uses of lead such as its use in gasoline are a major contributor to lead in soil, and higher levels of lead in soil are found near roadways. Most of the lead in inner city soils comes from old houses with paint containing lead and previous automotive exhaust emitted when gasoline contained lead.

Once lead falls onto soil, it sticks strongly to soil particles and remains in the upper layer of soil. That is why past uses of lead such as lead in gasoline, house paint, and pesticides are so important in the amount of lead found in soil.

Small amounts of lead may enter rivers, lakes, and streams when soil particles are moved by rainwater.

Small amounts of lead from lead pipe or solder may be released into water when the water is acidic or "soft". Lead may remain stuck to soil particles or sediment in water for many years. Movement of lead from soil particles into groundwater is unlikely unless the rain falling on the soil is acidic or "soft". Movement of lead from soil will also depend on the type of lead compound and on the physical and chemical characteristics of the soil.

Sources of lead in surface water or sediment include deposits of lead-containing dust from the atmosphere, waste water from industries that handle lead (primarily iron and steel industries and lead producers), urban runoff, and mining piles.

Some lead compounds are changed into other forms of lead by sunlight, air, and water. However, elemental lead cannot be broken down.

The levels of lead may build up in plants and animals from areas where air, water, or soil are contaminated with lead. If animals eat contaminated plants or animals, most of the lead that they eat will pass through their bodies.

1.3 How might I be exposed to lead?

Lead is commonly found in soil especially near roadways, older houses, old orchards, mining areas, industrial sites, near power plants, incinerators, landfills, and hazardous waste sites. People living near hazardous waste sites may be exposed to lead and chemicals that contain lead by breathing air, drinking water, eating foods, or swallowing dust or dirt that contain lead. People may be exposed to lead by eating food or drinking water that contains lead. Drinking water in houses containing lead pipes may contain lead, especially if the water is acidic or "soft". If one is not certain whether an older building contains lead pipes, it is best to let the water run a while before drinking it so that any lead formed in the pipes can be flushed out. People living in areas where there are old houses that have been painted with lead paint may be exposed to higher levels of lead in dust and soil. Similarly, people who live near busy highways or on old orchard land where lead arsenate pesticides were used in the past may be exposed to higher levels of lead. People may also be exposed to lead when they work in jobs where lead is used or have hobbies in which lead is used, such as making stained glass.

Foods may contain small amounts of lead. However, since lead solder is no longer used in cans, very little lead is found in food. Leafy fresh vegetables grown in lead-containing soils may have lead-containing dust on them. Lead may also enter foods if they are put into improperly glazed pottery or ceramic dishes and from leaded-crystal glassware. Illegal whiskey made using stills that contain lead-soldered parts (such as truck radiators) may also contain lead. Cigarette

smoke may also contain small amounts of lead. The amount of lead found in canned foods decreased 87% from 1980 to 1988 in the United States, which indicates that the chance of exposure to lead in canned food from lead-soldered containers has been greatly reduced. Lead-soldered cans are still used in some other nations. In the most recent studies, lead was not detectable in most foods and the average dietary intake of lead was about 1 microgram (a microgram is a millionth of a gram) per kilogram of body weight per day. Children may be exposed to lead by hand-to-mouth contact after exposure to lead-containing soil or dust.

In general, very little lead is found in lakes, rivers, or groundwater used to supply the public with drinking water. More than 99% of all publicly supplied drinking water contains less than 0.005 parts of lead per million parts of water (ppm). However, the amount of lead taken into your body through drinking water can be higher in communities with acidic water supplies. Acidic water makes it easier for the lead found in pipes, leaded solder, and brass faucets to be dissolved and to enter the water we drink. Public water treatment systems are now required to use control measures to make water less acidic. Plumbing that contains lead may be found in public drinking water systems, and in houses, apartment buildings, and public buildings that are more than 20 years old. However, as buildings age, mineral deposits form a coating on the inside of the water pipes that insulates the water from lead in the pipe or solder, thus reducing the amount of lead that can leach into the water. Since 1988, regulations require that drinking water coolers must not contain lead in parts that come into contact with drinking water.

Breathing in, or swallowing airborne dust and dirt, is another way you can be exposed to lead. In 1984, burning leaded gasoline was the single largest source of lead emissions. Very little lead in the air comes from gasoline now because EPA has banned its use in gasoline for motor vehicles. Other sources of lead in the air include releases to the air from industries involved in iron and steel production, lead-acid-battery manufacturing, and nonferrous (brass and bronze) foundries. Lead released into air may also come from burning of solid waste that contains lead, windblown dust, volcanoes, exhaust from workroom air, burning or weathering of lead-painted surfaces, fumes and exhaust from leaded gasoline, and cigarette smoke.

Skin contact with dust and dirt containing lead occurs every day. Recent data have shown that inexpensive cosmetic jewelry pieces sold to the general public may contain high levels of lead which may be transferred to the skin through routine handling. However, not much lead can get into your body through your skin.

In the home, you or your children may be exposed to lead if you take some types of home remedy medicines that contain lead compounds. Lead compounds are in some non-Western cosmetics, such as surma and kohl. Some types of hair colorants, cosmetics, and dyes contain lead acetate. Read the labels on hair coloring products, use them with caution, and keep them away from children.

People who are exposed at work are usually exposed by breathing in air that contains lead particles. Exposure to lead occurs in many jobs. People who work in lead smelting and refining industries, brass/bronze foundries, rubber products and plastics industries, soldering, steel welding and cutting operations, battery manufacturing plants, and lead compound manufacturing industries may be exposed to lead. Construction and demolition workers and people who work at municipal waste incinerators, pottery and ceramics industries, radiator repair shops, and other industries that use lead solder may also be exposed. Painters who sand or scrape old paint may be exposed to lead in dust. Between 0.5 and 1.5 million workers are exposed to lead in the workplace. In California alone, more than 200,000 workers are exposed to lead. Families of workers may be exposed to higher levels of lead when workers bring home

lead dust on their work clothes.

You may also be exposed to lead in the home if you work with stained glass as a hobby, make lead fishing weights or ammunition, or if you are involved in home renovation that involves the removal of old lead-based paint.

1.4 How can lead enter and leave my body?

Some of the lead that enters your body comes from breathing in dust or chemicals that contain lead. Once this lead gets into your lungs, it goes quickly to other parts of the body in your blood.

Larger particles that are too large to get into your lungs can be coughed up and swallowed. You may also swallow lead by eating food and drinking liquids that contain it. Most of the lead that enters your body comes through swallowing, even though very little of the amount you swallow actually enters your blood and other parts of your body. The amount that gets into your body from your stomach partially depends on when you ate your last meal. It also depends on how old you are and how well the lead particles you ate dissolved in your stomach juices.

Experiments using adult volunteers showed that, for adults who had just eaten, the amount of lead that got into the blood from the stomach was only about 6% of the total amount taken in. In adults who had not eaten for a day, about 60% of the lead from the stomach got into their blood. In general, if adults and children swallow the same amount of lead, a bigger proportion of the amount swallowed will enter the blood in children than in adults. Children absorb about 50% of ingested lead.

Dust and soil that contain lead may get on your skin, but only a small portion of the lead will pass through your skin and enter your blood if it is not washed off. You can, however, accidentally swallow lead that is on your hands when you eat, drink, smoke, or apply cosmetics (for example, lip balm). More lead can pass through skin that has been damaged (for example, by scrapes, scratches, and wounds). The only kinds of lead compounds that easily penetrate the skin are the additives in leaded gasoline, which is no longer sold to the general public. Therefore, the general public is not likely to encounter lead that can enter through the skin.

Shortly after lead gets into your body, it travels in the blood to the "soft tissues" and organs (such as the liver, kidneys, lungs, brain, spleen, muscles, and heart). After several weeks, most of the lead moves into your bones and teeth. In adults, about 94% of the total amount of lead in the body is contained in the bones and teeth. About 73% of the lead in children's bodies is stored in their bones. Some of the lead can stay in your bones for decades; however, some lead can leave your bones and reenter your blood and organs under certain circumstances (e.g., during pregnancy and periods of breast feeding, after a bone is broken, and during advancing age).

Your body does not change lead into any other form. Once it is taken in and distributed to your organs, the lead that is not stored in your bones leaves your body in your urine or your feces. About 99% of the amount of lead taken into the body of an adult will leave in the waste within a couple of weeks, but only about 32% of the lead taken into the body of a child will leave in the waste. Under conditions of continued exposure, not all of the lead that enters the body will be eliminated, and this may result in accumulation of lead in body tissues, especially bone.

1.5 How can lead affect my health?

Scientists use many tests to protect the public from harmful effects of toxic chemicals and to find ways for treating persons who have been harmed.

One way to learn whether a chemical will harm people is to determine how the body absorbs, uses, and releases the chemical. For some chemicals, animal testing may be necessary. Animal testing may also help identify health effects such as cancer or birth defects. Without laboratory animals, scientists would lose a basic method for getting information needed to make wise decisions that protect public health. Scientists have the responsibility to treat research animals with care and compassion. Scientists must comply with strict animal care guidelines because laws today protect the welfare of research animals.

The effects of lead are the same whether it enters the body through breathing or swallowing. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults to lead at work has resulted in decreased performance in some tests that measure functions of the nervous system. Lead exposure may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people. Lead exposure may also cause anemia. At high levels of exposure, lead can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

We have no conclusive proof that lead causes cancer (is carcinogenic) in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services (DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens based on limited evidence from studies in humans and sufficient evidence from animal studies, and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans. IARC determined that organic lead compounds are not classifiable as to their carcinogenicity in humans based on inadequate evidence from studies in humans and in animals.

1.6 How can lead affect children?

This section discusses potential health effects in humans from exposures during the period from conception to maturity at 18 years of age.

Studies carried out by the Centers for Disease Control and Prevention (CDC) show that the levels of lead in the blood of U.S. children have been getting lower and lower. This result is because lead is banned from gasoline, residential paint, and solder used for food cans and water pipes. However, about 310,000 U.S. children between the ages of 1 and 5 years are believed to have blood lead levels equal or greater than 10 $\mu\text{g}/\text{dL}$, the level targeted for elimination among young children in the United States by 2010.

Children are more vulnerable to lead poisoning than adults. Children are exposed to lead all through their lives. They can be exposed to lead in the womb if their mothers have lead in their bodies. Babies can swallow lead when they breast feed, or eat other foods, and drink water that contains lead. Babies and children can swallow and breathe lead in dirt, dust, or sand while they play on the floor or ground. These activities make it easier for children to be exposed to

lead than adults. The dirt or dust on their hands, toys, and other items may have lead particles in it. In some cases, children swallow nonfood items such as paint chips; these may contain very large amounts of lead, particularly in and around older houses that were painted with lead-based paint. The paint in these houses often chips off and mixes with dust and dirt. Some old paint contains as much as 50% lead. Also, compared with adults, a bigger proportion of the amount of lead swallowed will enter the blood in children.

Children are more sensitive to the health effects of lead than adults. No safe blood lead level in children has been determined. Lead affects children in different ways depending on how much lead a child swallows. A child who swallows large amounts of lead may develop anemia, kidney damage, colic (severe "stomach ache"), muscle weakness, and brain damage, which ultimately can kill the child. In some cases, the amount of lead in the child's body can be lowered by giving the child certain drugs that help eliminate lead from the body. If a child swallows smaller amounts of lead, such as dust containing lead from paint, much less severe but still important effects on blood, development, and behavior may occur. In this case, recovery is likely once the child is removed from the source of lead exposure, but there is no guarantee that the child will completely avoid all long-term consequences of lead exposure. At still lower levels of exposure, lead can affect a child's mental and physical growth. Fetuses exposed to lead in the womb, because their mothers had a lot of lead in their bodies, may be born prematurely and have lower weights at birth. Exposure in the womb, in infancy, or in early childhood also may slow mental development and cause lower intelligence later in childhood. There is evidence that these effects may persist beyond childhood.

Children with high blood lead levels do not have specific symptoms. However, health workers can find out whether a child may have been exposed to harmful levels of lead by taking a blood sample. They can also find out how much lead is in a child's bones by taking a special type of x ray of the finger, knee, or elbow. This type of test, however, is not routine.

1.7 How can families reduce the risk of exposure to lead?

If your doctor finds that you have been exposed to substantial amounts of lead, ask whether your children might also have been exposed. Your doctor might need to ask your state health department to investigate.

The most important way families can lower exposures to lead is to know about the sources of lead in their homes and avoid exposure to these sources. Some homes or day-care facilities may have more lead in them than others. Families who live in or visit these places may be exposed to higher amounts of lead. These include homes built before 1978 that may have been painted with paint that contains lead (lead-based paint). If you are buying a home that was built before 1978, you may want to know if it contains lead based paint. Federal government regulations require a person selling a home to tell the real estate agent or person buying the home of any known lead-based hazards on the property. Adding lead to paint is no longer allowed. If your house was built before 1978, it may have been painted with lead-based paint. This lead may still be on walls, floors, ceilings, and window sills, or on the outside walls of the house. The paint may have been scraped off by a previous owner, but paint chips and lead-containing dust may still be in the yard soil. Decaying, peeling, or flaking paint can introduce lead into household dust and the area where this is occurring should be repainted. If your paint is decaying or your child has symptoms of lead poisoning, you may want to have your house tested for lead. In some states, homeowners can have the paint in their homes tested for lead by their local health departments. The National Lead Information Center (1-800-532-3394)

has a listing of approved risk assessors (people who have met certain criteria and are qualified to assess the potential risks of a site) and of approved testing laboratories (for soil, paint, and dust).

Sanding surfaces painted with lead-based paint or using heat to peel the paint may cause exposure to high levels of lead. Many cases of lead poisoning have resulted from do-it-yourself home renovations. Therefore, any renovations should be performed by a licensed contractor who will minimize exposure to household members. It is important for the area being renovated to be isolated from the rest of the house because of lead-containing dust. The federal government requires that contractors who test for or remove lead must be certified by the EPA or an EPA-approved state program. Ask to see certifications of potential contractors. Your state health department or environmental protection division should be able to identify certified contractors for you. The National Lead Abatement Council (P.O. Box 535; Olney, MD 20932; telephone 301-924-5490) can also send you a list of certified contractors.

Families can lower the possibility of children swallowing paint chips by discouraging their children from chewing or putting these painted surfaces in their mouths and making sure that they wash their hands often, especially before eating. Lead can be found in dirt and dust. Areas where levels of lead in dirt might be especially high are near old houses, highways, or old orchards. Some children have the habit of eating dirt (the term for this activity is pica). Discourage your children from eating dirt and other hand-to-mouth activity.

Non-Western folk remedies used to treat diarrhea or other ailments may contain substantial amounts of lead. Examples of these include: Alarcon, Ghasard, Alkohl, Greta, Azarcon, Liga, Bali Goli, Pay-loo-ah, Coral, and Rueda. If you give your children these substances or if you are pregnant or nursing, you may expose your children to lead. It is wise to know the ingredients of any medicines that you or your children use.

Older homes that have plumbing containing lead may have higher amounts of lead in drinking water. Inside plumbing installed before 1930 is most likely to contain high levels of lead. Copper pipes have replaced lead pipes in most residential plumbing. You cannot see, taste, or smell lead in water, and boiling your water will not get rid of lead. If you have a water-lead problem, EPA recommends that anytime water in a particular faucet has not been used for 6 hours or longer, you should flush your cold water pipes by running water until it is cold (5 seconds to 2 minutes). Because lead dissolves more easily in warm water than in cold water, you should only use cold water for drinking, cooking, and preparing baby formula. You can contact your local health department or water supplier to find out about testing your water for lead. If your water tests indicate a significant presence of lead, consult your water supplier or local health department about possible remedies.

You can bring lead home in the dust on your hands or clothes if lead is used in the place where you work. Lead dust is likely to be found in places where lead is mined or smelted, where car batteries are made or recycled, where electric cable sheathing is made, where fine crystal glass is made, or where certain types of ceramic pottery are made. Pets can also bring lead into the home in dust or dirt on their fur or feet if they spend time in places that have high levels of lead in the soil.

Swallowing of lead in house dust or soil is a very important exposure pathway for children. This problem can be reduced in many ways. Regular hand and face washing to remove lead dusts and soil, especially before meals, can lower the possibility that lead on the skin is accidentally swallowed while eating. Families can lower exposures to lead by regularly cleaning the home of dust and tracked in soil. Door mats can help lower the amount of soil that is tracked into the

home; removing your shoes before entering the home will also help. Planting grass and shrubs over bare soil areas in the yard can lower contact that children and pets may have with soil and the tracking of soil into the home.

Families whose members are exposed to lead dusts at work can keep these dusts out of reach of children by showering and changing clothes before leaving work, and bagging their work clothes before they are brought into the home for cleaning. Proper ventilation and cleaning $\frac{1}{2}$ during and after hobby activities, home or auto repair activities, and hair coloring with products that contain lead $\frac{1}{2}$ will decrease the possibility of exposure.

Lead-containing dust may be deposited on plant surfaces and lead may be taken up in certain edible plants from the soil by the roots; therefore, home gardening may also contribute to exposure if the produce is grown in soils that have high lead concentrations. Vegetables should be well washed before eating to remove surface deposits. Certain hobbies and home or car repair activities like radiator repair can add lead to the home as well. These include soldering glass or metal, making bullets or slugs, or glazing pottery. Some types of paints and pigments that are used as facial make-up or hair coloring contain lead. Cosmetics that contain lead include surma and kohl, which are popular in certain Asian countries. Read the labels on hair coloring products, and keep hair dyes that contain lead acetate away from children. Do not allow children to touch hair that has been colored with lead-containing dyes or any surfaces that have come into contact with these dyes because lead compounds can rub off onto their hands and be transferred to their mouths.

It is important that children have proper nutrition and eat a balanced diet of foods that supply adequate amounts of vitamins and minerals, especially calcium and iron. Good nutrition lowers the amount of swallowed lead that passes to the bloodstream and also may lower some of the toxic effects of lead.

1.8 Is there a medical test to determine whether I have been exposed to lead?

The amount of total lead in the blood can be measured to determine if exposure to lead has occurred. This test shows if you have been recently exposed to lead. Lead can be measured in teeth or bones by x ray techniques, but these methods are not widely available. These tests show long-term exposures to lead. The primary screening method is measurement of blood lead. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter ($\frac{1}{2}$ g/dL). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

1.9 What recommendations has the federal government made to protect human health?

The federal government develops regulations and recommendations to protect public health. Regulations *can* be enforced by law. The EPA, the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) are some federal

agencies that develop regulations for toxic substances. Recommendations provide valuable guidelines to protect public health, but *cannot* be enforced by law. The Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH) are two federal organizations that develop recommendations for toxic substances.

Regulations and recommendations can be expressed as "not-to-exceed" levels, that is, levels of a toxic substance in air, water, soil, or food that do not exceed a critical value that is usually based on levels that affect animals; they are then adjusted to levels that will help protect humans. Sometimes these not-to-exceed levels differ among federal organizations because they used different exposure times (an 8-hour workday or a 24-hour day), different animal studies, or other factors.

Recommendations and regulations are also updated periodically as more information becomes available. For the most current information, check with the federal agency or organization that provides it. Some regulations and recommendations for lead include the following:

CDC recommends that states develop a plan to find children who may be exposed to lead and have their blood tested for lead. CDC recommends that the states test children:

- at ages 1 and 2 years;
- at ages 3½-6 years if they have never been tested for lead;
- if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children;
- if they live in a building or frequently visit a house built before 1950;
- if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or
- if they have a brother, sister, or playmate who has had lead poisoning.

CDC considers children to have an elevated level of lead if the amount of lead in the blood is at least 10 µg/dL. Many states or local programs provide intervention to individual children with blood lead levels equal to or greater than 10 µg/dL. Medical evaluation and environmental investigation and remediation should be done for all children with blood lead levels equal to or greater than 20 µg/dL. Medical treatment (i.e., chelation therapy) may be necessary in children if the lead concentration in blood is higher than 45 µg/dL.

EPA requires that the concentration of lead in air that the public breathes be no higher than 1.5 micrograms per cubic meter (µg/m³) averaged over 3 months. EPA regulations no longer allow lead in gasoline. The Clean Air Act Amendments (CAAA) of 1990 banned the sale of leaded gasoline as of December 31, 1995.

Under the Lead Copper Rule (LCR), EPA requires testing of public water systems, and if more than 10% of the samples at residences contain lead levels over 0.015 milligrams per liter (mg/L), actions must be taken to lower these levels. Testing for lead in drinking water in schools is not required unless a school is regulated under a public water system. The 1988 Lead Contamination Control Act (LCCA) was created to help reduce lead in drinking water at schools and daycare centers. The LCCA created lead monitoring and reporting requirements for schools, as well as the replacement of fixtures that contain high levels of lead. However, the provisions in the LCCA are not enforceable by the federal government and individual states have the option to voluntarily comply with these provisions or create their own.

To help protect small children, the Consumer Product Safety Commission (CPSC) requires that

the concentration of lead in most paints available through normal consumer channels be not more than 0.06%. The Federal Hazardous Substance Act (FHSA) bans children's products containing hazardous amounts of lead.

The Department of Housing and Urban Development (HUD) develops recommendations and regulations to prevent exposure to lead. HUD requires that federally funded housing and renovations, Public and Indian housing be tested for lead-based paint hazards and that such hazards be fixed by covering the paint or removing it. When determining whether lead-based paint applied to interior or exterior painted surfaces of dwellings should be removed, the standard used by EPA and HUD is that paint with a lead concentration equal to or greater than 1.0 milligram per square centimeter (mg/cm²) of surface area should be removed or otherwise treated. HUD is carrying out demonstration projects to determine the best ways of covering or removing lead-based paint in housing.

EPA has developed standards for lead-paint hazards, lead in dust, and lead in soil. To educate parents, homeowners, and tenants about lead hazards, lead poisoning prevention in the home, and the lead abatement process, EPA has published several general information pamphlets. Copies of these pamphlets can be obtained from the National Lead Information Center or from various Internet sites, including <http://www.epa.gov/opptintr/lead>.

OSHA regulations limit the concentration of lead in workroom air to 50 µg/m³ for an 8 hour workday. If a worker has a blood lead level of 50 µg/dL or higher, then OSHA requires that the worker be removed from the workroom where lead exposure is occurring.

FDA includes lead on its list of poisonous and deleterious substances. FDA considers foods packaged in cans containing lead solders to be unsafe. Tin-coated lead foil has been used as a covering applied over the cork and neck areas of wine bottles for decorative purposes and to prevent insect infestations. Because it can be reasonably expected that lead could become a component of the wine, the use of such foil is also a violation of the Federal Food, Drug, and Cosmetic Act. FDA has reviewed several direct human food ingredients (i.e., food dyes) and has determined them to be "generally recognized as safe" when used in accordance with current good manufacturing practices. Some of these ingredients contain allowable lead concentrations that range from 0.1 to 10 ppm.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological profile for Lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

If you have questions or concerns, please contact your community or state health or environmental quality department or:

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences
1600 Clifton Road NE, Mailstop F-57
Atlanta, GA 30329-4027
Phone: 1-800-CDC-INFO · 888-232-6348 (TTY)

Email: Contact CDC-INFO

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses resulting from exposure to hazardous substances.

Information line and technical assistance:

Phone: 888-422-8737

To order toxicological profiles, contact:

National Technical Information Service

5285 Port Royal Road

Springfield, VA 22161

Phone: 800-553-6847 or 703-605-6000

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ToxFAQs™ for Lead

Languages other than English ▼

August 2007

CAS# 7439-92-1

PDF Version, 46 KB

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

Highlights

Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,272 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is lead?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years. The use of lead as an additive to gasoline was banned in 1996 in the United States.

What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead

compound and the characteristics of the soil.

How might I be exposed to lead?

- Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out into the water.
- Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.
- Working in a job where lead is used or engaging in certain hobbies in which lead is used, such as making stained glass.
- Using health-care products or folk remedies that contain lead.

How can lead affect my health?

The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. Highlevel exposure in men can damage the organs responsible for sperm production.

How likely is lead to cause cancer?

We have no conclusive proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services (DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans.

How does lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in

young children. These effects are more common if the mother or baby was exposed to high levels of lead. Some of these effects may persist beyond childhood.

How can families reduce the risk of exposure to lead?

- Avoid exposure to sources of lead.
- Do not allow children to chew or mouth surfaces that may have been painted with lead-based paint.
- If you have a water lead problem, run or flush water that has been standing overnight before drinking or cooking with it.
- Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children.
- If your home contains lead-based paint or you live in an area contaminated with lead, wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to show whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your recent exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth or bones can be measured by X-ray techniques, but these methods are not widely available. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (µg/dL). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that states test children at ages 1 and 2 years. Children should be tested at ages 3-6 years if they have never been tested for lead, if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children, if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers a blood lead level of 10 µg/dL to be a level of concern for children.

EPA limits lead in drinking water to 15 µg per liter.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Lead (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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